PHYS 165 Physics — 3 credits

Prerequisites: College Algebra and HS physics

Instructors: Matt Dodd, MS
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Contact Information: Faculty may be contacted through the Canvas messaging system

Additional Information: www.portagelearning.com*

Course meeting times: PHYS 165 is offered continuously

Course Description: A single-semester, comprehensive exploration of the fundamental laws, theories, and mathematical concepts as they relate to a college-level survey of physics. Course content includes classical mechanics, electricity and magnetism, and modern physics. Specific topics include, some basics of science, kinematics, dynamics, energy, momentum, waves, electricity, magnetism, quantum mechanics and relativity. While there is no lab component to this course, students will be expected to learn the material on a conceptual level as well as solve mathematic problems using algebra-based physics equations.

Course Outcomes: As a result of this course experience a student should be able to:

- Define and apply the principles of the scientific method and measurement
- Create and explain appropriate data-based conclusions
- Describe physical quantities and units of measure
- Identify physical quantities as vectors and scalars
- Define each of Newton's three laws of motion
- Compare and contrast momentum and impulse
- Define torque, rotational inertia and the calculations associated with each
- Describe wave motion and identify objects exhibiting periodic motion and in simple harmonic motion
- Explain Huygens principle, wave propagation, diffraction, reflection and refraction
- Differentiate between static and current electricity
- Define and apply Coulomb's, Ohm's, and Kirchhoff's Laws
- Apply the concepts of electric field, capacitors, resistance, and AC/DC
- Describe the basics of magnetism including the types magnetic poles, the Fundamental Law of Magnetism, magnetic field and magnetic field lines
- Calculate the force exerted on a charged object moving in a magnetic field
- Calculate the magnetic force exerted on a current carrying wire in a magnetic field
- Differentiate between a quantized variable and a continuous variable

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- Relate quantization of energy to the emission spectrum of materials
- Explain the Heisenberg Uncertainty Principle
- Describe some of the effects of relativity including time dilation, length contraction and mass increase

*Please see the *Module & Lab Topics* section below for expanded course outcomes.

The PHYS 165 student learning outcomes are measured:

Directly by: (1) Module application problems (with instructor feedback)
(2) Module Exams
(3) Cumulative final exam

Indirectly by an end of course student-completed evaluation survey

Course Delivery: This course is asynchronously delivered online. Contact hours include 50 - 60 hours of reviewed module assignments with instructor feedback and video lectures. There are 10 additional contact hours composed of secure online exams.

Course Progression: It is the policy for all Portage Learning courses that only one (module/final) exam is to be completed within a 48-hour period. Research on the best practices in learning indicates that time is needed to process material for optimal learning. This means that once an exam has been completed, the next exam may not be opened or taken until 48 hours after the submission of the previous module exam. This allows for instructor feedback/class expectations as the student moves through the material. Instructors, like the College, are not available during the weekend; grading, therefore, is M-F and may take up to 72 hours during these days. Also, it is the policy of Portage Learning to support a minimum of 28 days to complete a course; this is not a negotiable time period. Please plan your time accordingly.

Note: Professors reserve the right to reset any exam taken in violation of these guidelines.

Required readings, lectures and assignments: Portage courses do not use paper textbooks. Students are required to read the online lesson modules written by the course author which contain the standard information covered in a typical course. Please note the exam questions are based upon the readings. Video lectures which support each lesson module subject should be viewed as many times as is necessary to fully understand the material.

We do not support the use of outside resources to study, except for the ones listed in the syllabus under "Suggested External References". If you have questions about the material or would like further explanation of the concepts, please contact your instructor.

Module Review Questions: The practice problems within the modules are a part of your final grade, and the module work will be reviewed for completeness (not correctness) by the instructor. Be sure to answer all of the problems, being careful to answer the questions in your own words at all times since this is an important part of adequate preparation for the exams. For problems that require calculations, you must show your work by including the initial set up for the problem and your final answer. Problem sets submitted with only a final answer will not be considered complete. After you answer the practice problems, compare your answers to the solutions provided at the end of the module. If your answers do not match those at the end, attempt to figure out why there is a difference. If you have any questions, please contact the instructor via the Canvas messaging system (see Inbox icon).

Academic Integrity is a serious matter. In the educational context, any dishonesty violates freedom and trust, which are essential for effective learning. Dishonesty limits a student's ability to reach his or her potential. Portage places a high value on honest independent work. We depend on the student's desire to succeed in the program he or she is entering. It is in a student's own best interests not to cheat on an exam or put their work into question, as this would compromise the student's preparation for future work. It is the student's responsibility to review the **Student Handbook** and all policies related to academic integrity. If clarification is necessary, the student should reach out to their instructor for further explanation **before** initiating module one.

Required Computer Accessories: It is recommended that students use a desktop or laptop computer, PC or Mac, when taking the course. Some tablet computers are potentially compatible with the course, but not all features are available for all tablet computers. The latest full version of Google Chrome, Firefox, Edge, or Safari browser is required for the optimal operation of the Canvas Learning Management System. In addition, this course will use the Respondus Lockdown Browser for exams; a strong internet connection is needed. You are also **required to use LockDown Browser with a webcam**, which will record you during an online, nonproctored exam. (The webcam feature is sometimes referred to as "Respondus Monitor.") **Your computer must have a functioning webcam and microphone. Additionally, students will need a photo ID that includes your picture and full name is required. Please note, Chromebooks and tablets (other than iPad) are not compatible on exams using the Lockdown Browser.** Instructions on downloading and installing this browser will be given at the start of the course. We highly recommend using a high-speed Internet connection to view the video lectures and labs. You may experience significant difficulties viewing the videos using a dial-up connection.

For more information on basic system and browser requirements, please reference the following:
Canvas browser and system requirements: https://community.canvaslms.com/t5/Canvas-Basics-Guide/What-are-the-browser-and-computer-requirements-for-Canvas/ta-p/66
Respondus Requirements: https://web.respondus.com/he/lockdownbrowser/resources/
Respondus Monitor Requirements: https://web.respondus.com/he/monitor/resources/

Additional Tools: A built-in **scientific calculator** for the course has been incorporated into the website and can be found in the tool bar above each module and exam page. If you choose to purchase a calculator, keep in mind that you do not need to purchase an expensive calculator as the features you will need are available on basic scientific calculators with a cost of less than $20.

The only calculator that is permitted during an exam is the one that is provided in the course introductory materials and within the exam. It would be wise to familiarize yourself with this calculator and use it for both the practice problems and module problem sets. A tutorial is also provided in the course introductory material. You are allowed to copy and paste your answers from the calculator into the answer boxes. If you have any questions regarding how to input numbers or perform certain calculations, please contact your instructor for assistance before moving forward in the course.

Modules

Module 1: This module introduces the science of physics by examining various historical views of physics. It also includes a discussion of the modern scientific method and experimentation techniques. Ethics and diversity in science is also discussed.

Module 2: Kinematics is the study of motion. The metric system is explained, compared to the English customary system and applied. Students will learn how to describe the motion of objects using displacement, velocity and acceleration. Motions investigated will include constant velocity, constant acceleration, free fall motion, and two-dimensional motion.

Module 3: This module will investigate the causes of motion which is the study of dynamics. The concept of force will be explained including free body diagrams. Newton's laws of motion will be discussed and applied. Several types of forces will be investigated gravity, normal, tension, friction, and elastic.

Module 4: This module builds upon the last modules to delve into work, power, and energy. Connections to force and work and power will be created. The interaction between various types of energy will be built. Types of energy will be defined including Kinetic, Gravitational Potential, and Elastic Potential energy. Conservation of energy will also be defined and applied to situations.

Module 5: Momentum and rotational motion are explored in this module. It will start with linear momentum and its relationship with impulse. Next the Impulse-Momentum Theorem will be explored along

with conservation of momentum. This will then leas into a discussion of Rotational Kinematics and Dynamics including rotational momentum and rotational inertia.

Module 6: This module starts with a look at Periodic Motion and Simple Harmonic Motion. This will include a look at the simple pendulum and masses bouncing on springs. Next the concept of waves will be investigated including the properties of waves, types of waves, and the properties of waves. Sound, light, and electromagnetic waves will be explored.

Module 7: The module on Static Electricity will investigate the various methods of describing static electricity including types of charges, methods of charging, The Fundamental Law of Electrostatics, Coulombs Law, Electric Field, Electric Potential, and Electric Potential Energy. Capacitors will be described, and this will lead into current electricity.

Module 8: The module on Current Electricity will build upon the module on Static Electricity. It will include an exploration of electric current, Ohm's Law, Resistance, Electric Power, AC versus DC current and Kirchhoff's Laws.

Module 9: The module on Magnetism will describe the basics of magnetism and compare these properties to the similar, but not identical, ones from Electricity. Domain Theory, types of magnetism, the Earth's Magnetic Field, will all be explored along with the interaction between electricity and magnetism. Electromagnetic Induction will be introduced and related to motors, generators, transformers, and inductance.

Module 10: This module will explore the world of Quantum Mechanics and Relativity. It will start with blackbody radiation and introduce the concept of Quantized Energy. Next several experimental observations of phenomena will be discussed that also support Quantum Mechanics. This will include The Photoelectric Effect, The Compton Effect, Electron Orbitals and the Emission Spectrum of Atoms. Next Wave-Particle duality will be discussed along with some other aspects of modern physics including the Heisenberg Uncertainty Principle. Models of the Atom, and Quarks. Finally, Relativity will be discussed including Time Dilation, Length Contraction, and Mass Increase. Example experimental evidence of these implications will be discussed.

Suggested Timed Course Schedule (to complete the course within a typical college semester)

All Portage courses are offered asynchronously with no required schedule to better fit the normal routine of adult students, but the schedule below is suggested to allow a student to complete the course within a typical college semester. Students may feel free to complete the course on a schedule determined by them within the parameters outlined under “Course Progression.”

Time Period	Assignments	Subject Matter
Days 1-12	Module 1, Exam 1	Science basics and a brief history of physics
Days 13-24	Module 2, Exam 2	Kinematics, displacement, velocity, acceleration, free fall motion and two-dimensional motion
Days 25-36	Module 3, Exam 3	Dynamics, Newton’s laws, gravity, tension, friction, and elastic
Days 37-48	Module 4, Exam 4	Work, energy, power, gravitational and elastic potential energy, conservation of energy.
Days 49-60	Module 5, Exam 5	Momentum and rotational motion
Days 61-72	Module 6, Exam 6	Simple harmonic motion, sound, light, and electromagnetic waves, diffraction, reflection, refraction, Huygens principle
Days 73-84	Module 7, Exam 7	Static Electricity, Coulombs law, electric field, capacitors,
Days 85-96	Module 8, Exam 8	Current Electricity, Ohm’s law, resistance, AC/DC, Kirchhoff’s law
Days 96-108	Module 9, Exam 9	Magnetism, domain theory, electromagnetic induction
Days 109-120	Module 10, Exam 10	Quantum mechanics, photoelectric effect, Compton effect, wave-particle duality, Relativity, time dilation, length contraction, mass increase
Days 121-132	Final Exam	Comprehensive - including all course material

Grading Rubric:

Check for Understanding =	1 pt.
10 Module exams = 100 pts. each x 10 =	1000 pts.
Review question = 5 pts. each x 10 =	50 pts
Final exam = 200 pts.	200 pts.
Total	1251 pts.

Grading Scale:

96.5% - 100% = A+
92.5% - 96.4% = A
89.5% - 92.4% = A
86.5% - 89.4% = B+
82.5% - 86.4% = B
79.5% - 82.4% = B-
76.5% - 79.4% = C+
72.5% - 76.4% = C
69.5% - 72.4% = C-
66.5% - 69.4% = D+
62.5% - 66.4% = D
59.5% - 62.4% = D-
0% - 59.4% = F

Suggested External References:

If the student desires to consult a reference for additional information, the following textbooks are recommended as providing complete treatment of the course subject matter.

- Knight, Jones, & Fields, **College Physics: A Strategic Approach**, Pearson's Publishing
- Giancoli, **Physics: Principles with Applications**, Pearson's Publishing
- Urone and Hinrichs, **College Physics**, OpenStax Publishing

NOTE: We do not support the use of outside resources to study, except the ones listed above.

Learning Support Services:

Each student should be sure to take advantage of and use the following learning support services provided to increase student academic performance:

Video lectures: Supports diverse learning styles in conjunction with the text material of each module

Messaging system: Provides individual instructor/student interaction

Tech support: Available by submitting a help ticket through the student dashboard

Accommodations for Students with Learning Disabilities:

Students with documented learning disabilities may receive accommodations in the form of an extended time limit on exams, when applicable. To receive the accommodations, the student should furnish documentation of the learning disability at the time of registration, if possible. Scan and e-mail the documentation to studentservices@portagelearning.com. Upon receipt of the learning disability documentation, Portage staff will provide the student with instructions for a variation of the course containing exams with extended time limits. This accommodation does not alter the content of any assignments/exams, change what the exam is intended to measure or otherwise impact the outcomes of objectives of the course.

One-on-one Instruction:

Each student is assigned to his/her own instructor. Personalized questions are addressed via the student dashboard messaging system.

Online learning presents an opportunity for flexibility; however, a discipline to maintain connection to the course is required; therefore, communication is essential to successful learning. **Check your messages daily.** Instructors are checking messages daily Monday-Friday to be sure to answer any questions that may arise from you. It is important that you do the same so you do not miss any pertinent information from us.

Holidays:

During the following holidays, all administrative and instructional functions are suspended, including the grading of exams and issuance of transcripts.

New Year's Day
Memorial Day
Labor Day
Christmas Break
Easter
Independence Day
Thanksgiving weekend

The schedule of holidays for the current calendar year may be found under the Student Services menu at www.portagelearning.com

Code of Conduct: Students are expected to conduct themselves in a way that supports learning and teaching and promotes an atmosphere of civility and respect in their interactions with others. Verbal and written aggression, abuse, or misconduct is prohibited and may be grounds for immediate dismissal from the program.

This is a classroom; therefore, instructors have the academic freedom to set forth policy for their respective class. Instructors send a welcome e-mail detailing the policy of their class, which students are required to read prior to beginning the course.

Grievances: If a student has a complaint about the coursework or the instructor, the student is advised to first consult the instructor, who will be willing to listen and consider your concern. To file a formal grievance for consideration by the Academic Review Committee, the process must be initiated via written communication to academics@portagelearning.com.

Remediation: At Portage Learning we allow a "one-time" only opportunity to re-take an alternate version of **one** module exam on which a student has earned a grade lower than 70%. This option must be exercised before the final exam is started. If an exam is retaken, the original exam grade will be erased and the new exam grade will become a permanent part of the course grade. However, before scheduling and attempting this retest, the student must resolve the questions they have regarding the material by reviewing both the old exam and the lesson module material. Once ready to attempt the retest of the exam they must contact their instructor to request that the exam be reset for the retest. Remember, any module retest must be requested and completed **before** the final exam is opened.

Note: Exams on which a student has been penalized for a violation of the academic integrity policy may not be re-taken.

Syllabi are subject to change as part of ongoing educational review practices. Students are responsible for accessing and using the most recent version of the course syllabus.